Updated Estimates of Vitamin a Total Body Stores in Healthy Young Adults Determined by Compartmental Modeling with Vitamin a Intake Added as Data (FS06-07-19)

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Objectives: We applied a new modeling approach to generate estimates of vitamin A total body stores (TBS) for previously-studied subjects (Green et al. J Nutr 2016;146:2129–36) who were consuming moderate amounts of preformed vitamin A. Based on recent work, we hypothesized that inclusion of an estimate of vitamin A dietary intake (DI) during modeling would help compensate for the less-than-optimal study duration (14 d).

Methods: We reanalyzed retinol kinetic data collected after ingestion of [$^{13}C_{10}$]retinyl acetate by 26 young adults of European ancestry for whom estimates of DI were available. To predict TBS by compartmental analysis, geometric mean (GM) data on fraction of dose in plasma versus time plus estimated intake (2.9 μmol retinol activity equivalents/d) were analyzed using the Simulation, Analysis and Modeling software in light of previously-established models. We also used modeling to estimate coefficients ("FaS") used in retinol isotope dilution (RID) equations and calculated TBS for the group and individuals.

Results: TBS predicted by the model without DI data included was 98 μmol; when the GM DI was included in the modeling data stream, predicted TBS was 273 μmol. Including DI data during modeling also resulted in lower predictions of intake [2.9 versus 8.7 μmol/d without DI, compared with the average RDA for adults (2.8 μmol/d)] and longer predicted days of vitamin A stores (125 versus 15 d). Using the FaS at 7 d (0.90) predicted by the model with DI, RID-predicted TBS agreed with the model prediction (GM, 274 μmol, range 106–889 μmol).

Conclusions: Results indicate that including an estimate of DI during modeling provides more realistic predictions of TBS for studies of short duration and improves confidence in model prediction of vitamin A status.

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